



GCSE

Combined Science: Trilogy

8464/B/2F Combined Science: Trilogy Biology Paper 2F

Report on the exam

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Overview

This paper is one of the six examined components for Combined Science: Trilogy. All of these papers follow a similar structure and test the same assessment objectives.

This paper has 70 marks available to students and is made up of six questions.

- Approximately 40% of marks assess AO1; 40% of marks assess AO2; and 20% of marks assess AO3.
- Approximately 60% of marks target Low demand and 40% of marks target Standard demand.

Questions 5 and 6 on this paper and questions 1 and 2 on the Higher Tier paper are common. These questions are identical and are targeted at Standard demand.

Questions are set at two levels of demand for this paper:

- **Low demand** questions are designed to broadly target grades 1–3.
- **Standard demand** questions are designed to broadly target grades 4–5.

A student's final grade is based on their attainment across all six papers.

Summary of overall performance

The specification should be used as a guide to the level of detail that students are expected to recall and use. For example, in question **01.6**, 'eat a balanced diet' was insufficient.

Students can never be given credit to repeating information in the question. This was common in questions where students were given information in tables (such as in question **02.5**), or information in the stem of the question to steer students in the required direction (such as in question **02.7**).

Understanding a described method for a required practical is a challenge for many students, as seen across question **03**. This suggests limited experience of practical work for some students. Responses to question **03.8** suggesting changing the method to throwing quadrats were surprisingly common. As has been included in previous examiner reports, throwing quadrats is never an appropriate method.

Mathematical skills were generally demonstrated with proficiency. The exception to this was the calculation in question **03.5**, where calculator skills appear to be an issue in the calculation of a mean. Some students put all the numbers into the calculator at once and therefore only divided the final number by 5.

Generally, students correctly completed the genetic diagram (Punnett square) in question **05.2**. However, students are often still missing one step in the instructions. In this instance, that was to 'identify any offspring that will have white fur', therefore that mark was rarely awarded.

Question 1 (Low demand)

- 01.1** Nearly 90% of students correctly identified that blood glucose concentration increases soon after drinking a glucose solution.
- 01.2** Over 85% of students knew that the pancreas produces insulin.
- 01.3** Over 40% of students correctly recalled that liver and muscle are target organs for insulin.
- 01.4** The most common error was to give the answer glycogen and then glucose to complete the sentences.
- 01.5** It was more common for students to incorrectly state that insulin causes blood glucose concentration to increase, rather than to decrease.
- 01.6** Many students were able to gain one of the two marks here, most often for stating 'do exercise' to reduce the risk of developing Type 2 diabetes. References to an appropriate diet change were rare, with students frequently giving answers that lacked sufficient detail, such as 'have a healthy diet' or 'eat a balanced diet'. The specification should be used as a guide to the level of detail students should include in their responses.

0 1 . 6 Type 2 diabetes is caused when the body cells no longer respond to insulin.

Give **two** ways to reduce the risk of developing Type 2 diabetes.

Do **not** refer to insulin in your answer.

[2 marks]

1 healthy diet

2 reducing sugar intake

In this example, the student would not gain a mark for 'healthy diet', but the more detailed response 'reducing sugar intake' is appropriate, therefore 1 mark was awarded.

Question 2 (Low and Standard demand)

- 02.1** The correct role of fertiliser was seen more frequently than that of herbicide, but many students did not seem familiar with either term.
- 02.2** Fewer than half of students could identify the secondary consumer in the food chain. 'Mice' was the most commonly selected answer, presumably with students focussing on the 'secondary' rather than understanding the term 'secondary consumer'.
- 02.3** Most often, students could identify that insects pollinating the crop would increase yield, but fewer students realised that insects eating pests on the crop would also increase crop yield.
- 02.4** Many students gave a correct suggestion about why farmers increase the size of hedgerows. Most frequently this was the idea of keeping animals or people out or increasing the number of insects. Responses suggesting that this gives more space for crops to grow was a frequent misconception, along with incorrect ideas of what hedges are and how much of a barrier they represent, for example, preventing insects passing through or preventing the spread of disease. Some students mistakenly thought hedgerows would keep birds out. Overall, there was a lack of appreciation for the role of hedgerows in increasing biodiversity.
- 02.5** Student can never be given credit to repeating information in the question, so statements such as 'the water drains slow' could not be awarded mark point 1. If students went a little further to state that 'the water drains more slowly', the response was then comparative and the mark could be awarded.

Peat comes from peat bogs.

0 2 . 5 Peat can be used to produce garden compost.

Table 1 compares peat compost with a sample of soil.

Table 1

	Mineral ion concentration	Speed at which water drains through
Peat compost	Low	Slow
Soil	High	Fast

Young plants have short roots.

Explain **one** advantage of growing young plants in peat compost instead of in soil. **[2 marks]**

They have a low mineral ion concentration.
A slow speed at which water drains through.

This student has not added any information that is not taken directly from Table 1, therefore no marks could be awarded. If the student had stated 'A slower speed at which water drains through' then the mark would be awarded for that comparative response.

- 02.6** 'Transpiration' was frequently given as an incorrect answer. Presumably because students are more familiar with plants transpiring, than with plants respiring.
- 02.7** Students were provided with the information that peat contains carbon compounds and that burning peat contributes to climate change. Therefore, neither of those ideas could be awarded credit. The most common response that did not gain credit was that 'burning peat releases carbon and contributes to climate change'. Some students were incorrectly linking carbon dioxide with the ozone layer.
- 02.8** Nearly 50% of students could identify that both bacteria and fungi cause decay. The most common incorrect answer was 'algae'.
- 02.9** The wide mark scheme indicates the many and varied ways that students could answer this question. All the ideas on the mark scheme were seen. When the mark was not awarded, this was usually because students had not read or understood the question and they responded in terms of 'fewer trees giving out oxygen'.

Question 3 (Low and Standard demand)

- 03.1** 80% of students could identify the equipment as a quadrat.
- 03.2** Some students counted all squares containing some buttercup plants and therefore reached a number of 10 small squares. They could gain one mark with a correct calculation of the final answer of 40, but only if appropriate working was shown. It is possible that this error indicates a lack of practical experience of Required Practical Activity 7 and the wide range of ways that abundance and distribution of a species can be sampled.
- 03.3** Two thirds of students could identify the independent variable.
- 03.4** Just over half of students identified the advantage of calculating percentage cover instead of counting the number of buttercup plants in an area.
- 03.5** Most students could calculate the mean. When only one mark was awarded, for correct working, but the final answer was incorrect, it appears calculator skills are the issue, with students putting all the numbers into the calculator at once and therefore only dividing the final number by 5. For example, $12 + 8 + 4 + 12 + 4 \div 5 = 36.8$.
- 03.6** Nearly two thirds of students could give one conclusion from the results. Some students did not answer the question, and instead gave a reason for the results, such as 'more sunlight further from the tree'.
- 03.7** Students most frequently referred to water or rain or light. Some students gave light and shade, which were the same marking point, therefore only gained one mark.
- 03.8** Students struggled to suggest improvements to the method. Most students who did gain a mark gave bullet point 1 on the mark scheme for the idea of varying the distances more. Responses suggesting changing the method to throwing quadrats were surprisingly common. As has been included in previous examiner reports, throwing quadrats is never an appropriate method.

Question 4 (Low and Standard demand)

04.1 Many students gave correct ideas about skin decaying, or a lack of evidence. Many students repeated the information provided and simply stated 'they are extinct'. Repeating information provided can never be given credit.

04.2 For marking point 1, students could either describe how structure A was adapted, such as 'wide' or 'paddle-like', or use a term such as fin or flipper.

Marking point 2, for the explanation of how the structure would help the plesiosaur survive in the ocean, was more commonly seen than marking point 1.

A surprising number of students thought the label was directed at the neck. These responses could not gain credit.

04.3 Over 60% of students could identify the adaptation as behavioural.

04.4 Two thirds of student correctly interpreted the figure.

04.5 Many students made two correct readings and calculated the number of years correctly. Where errors were made, this was most often for misinterpreting the scale. 170 was frequently seen instead of 180.

04.5

Determine how many million years plesiosaur **B** existed for.

Use Figure 6.

[2 marks]

$$220 - 170 = 50$$

Time = 50 million years

This student took two incorrect readings from the figure, therefore gains no marks, despite the final answer given being the same as the mark scheme. They have clearly demonstrated that they reached the answer through an incorrect method.

04.6 Two thirds of students could identify two reasons why the exact date of extinction can only be estimated.

04.7 Almost 70% of students could select the correct statement as evidence.

04.8 The most common correct answer was that (some) fossils have been destroyed. Few students gained both marks.

04.9 Students had difficulty expressing their responses, and again, repeating information from the question was insufficient. Some students were too vague to gain credit, with responses such as 'it makes you ill'. Some misconceptions between antibiotic resistance and the term 'immunity' were seen and some students showed confusion over what was resistant, such as stating that the body is resistant.

Question 5 (Standard demand)

05.1 The most common incorrect answer was a gene linked to 'a fur colour that is seen'. Students seemed to have a better understanding of the meaning of the term genome.

05.2 45% of students on Foundation tier gained 4 or more marks.

Those students who were able to put the gametes given in the question stem correctly into the Punnet square generally also achieved 2 marks for the correct derivations. Many students failed to identify the offspring that would have white fur and consequently could not be awarded marking point 4. However, the probability mark was often seen and was awarded if it was correct for the student's derivations.

Some students used the Punnet square incorrectly, with gametes given on the outside of the square and more than four derivations.

The most common error was students using both parent genotypes as Bb.

A number of 50/50 answers were seen despite this being highlighted in previous examiner reports as not being an equivalent probability to 0.5 or 50:50. Some students incorrectly gave the probability as 50, rather than 50% and therefore could not be awarded marking point 5.

05.3 This proved a very challenging question with relatively few students gaining a mark. Commonly, students tried to answer in terms of dominant and recessive alleles or genotypes, described the inheritance of alleles from parents, or described the different roles of sperm cells and body cells. Very few made any reference to chromosomes, and even fewer mentioned meiosis.

A frequently seen misconception was that 'sperm contain half a chromosome', illustrating that some students struggle with the abstract concepts relating to this part of the specification. Incorrect use of terminology was frequent, such as 'body cells are heterozygous, but sperm cells are homozygous'. Another frequent misconception was the idea that body cells contain maternal and paternal genes or chromosomes, but that sperm cells only contain paternal genes or chromosomes.

0 5 . 3

A male rabbit is heterozygous for fur colour.

The rabbit's body cells have the genotype **Bb**.

One of the sperm cells from the rabbit has the allele **b**.

Explain why the alleles in the rabbit's body cells and the allele in the sperm cell are different.

[2 marks]

The sperm cell has half of the rabbit's DNA and when combined with the other half that is in a female rabbit's egg it creates a whole cell.

This student has given a common response that could not be awarded either mark. 'Half of the rabbit's DNA' is insufficiently clear as to which 'half' is in the sperm cell, therefore is not equivalent to marking point 1.

- 05.4** A small proportion of students correctly gave an answer of 44, and very few gave the correct equivalent answer of 22 pairs. The most common incorrect answers were 21, 22 and 42, although those also frequently seen included 1, 2, 11, 23 and 46.
- 05.5** This question asked for evidence from the figure that the rabbit was female. This was answered well with many students stating that there were 2 X chromosomes. A few students did not gain the mark because they stated '2 X genes' or '2 X alleles'. Some students recognised the absence of the Y chromosome which also gained the mark.

Question 6 (Standard demand)

- 06.1** The most common answer was oestrogen, with many alternative spellings. The usual rule regarding phonetic spelling was applied. See page 5 of the mark scheme for an explanation of how this is applied. Progesterone was less frequently given, and testosterone was given by a few students and was also correct.

Incorrect responses included FSH / LH / other varied combination of letters. The reference to something being 'produced in the ovaries' led some students to respond with 'eggs' instead of a hormone. Glucagon, adrenaline and insulin were occasionally offered as an answer.

- 06.2** Many students gave correct answers to this question, the responses being evenly split between the two points listed in the mark scheme.

Puberty was often named in relation to bullet point 2 and various secondary sexual characteristics were suggested, the most frequent being 'muscle growth'.

Incorrect answers often arose from not reading the question and giving the name of the hormone released from the testes as testosterone.

Credit was not gained for statements that:

- were too vague such as – 'hair growth', 'helps males develop' or 'sperm' without qualification
- named the hormone rather than its function
- referred to functions of sperm cells rather than of the hormone
- suggested adaptations of sperm cells instead.

- 06.3** Students generally gave appropriate answers here, the most commonly seen correct response being 'protection from sexually transmitted infections'. A significant number also identified the lack of side effects or the accessibility of condoms. Credit was not given for responses which focused only on either how condoms acted as a method of contraception or their relative efficacy.

- 06.4** This was a levelled, extended response question based on hormonal methods of contraception. On the Foundation tier paper, students found it a challenge to include relevant detail about hormonal contraception.

The indicative content covered both the naming of methods and the key details of those methods.

Students achieving a Level 1 mark had to correctly give at least one point from the indicative content. This could be a named hormonal method, or relevant detail as demonstrated by the indicative content. Students were most often able to list one, or several hormonal methods, but did not give any detail and therefore could not be awarded a mark within Level 2.

Frequently seen aspects of answers that did not gain credit included:

- inclusion of non-hormonal methods such as the condom / sterilisation / spermicides
- consideration of IVF as a method of contraception
- details of the normal roles of hormones and of their interactions without relating to their significance in contraception
- statements that were too vague such as 'it makes the body believe it is pregnant' / 'it has an effect on' (e.g. eggs being released) or 'it controls' (e.g. FSH production) without any specific creditworthy detail
- evaluation of the efficacy rather than a description of methods as was asked for in the question.

There were a few misconceptions with students stating that the hormones killed the sperm or stopped the sperm entering the egg. Others responded that the contraceptive pill makes the body produce oestrogen / progesterone, rather than 'containing' those hormones. Some students also thought the hormones had a 'rebalancing' effect on the body or gave insufficient answers such as 'the body is tricked into thinking it is pregnant'.

0 6 . 4 Describe how **hormones** are used in different methods of contraception.

[6 marks]

hormones are typically used in the contraceptive pills and the implant. They release hormones into the blood stream and the hormone stops the release of the egg and also thickens the lining of the uterus, by doing this it helps to prevent the sperm reaching the egg. In condoms no hormones are used as they act as a barrier to stop the sperm reaching the egg and prevents STIs too.

This student has given two methods of hormonal contraception (pill and implant) and three details (hormones released into bloodstream, hormones stopping release of the egg, and thickens the lining of the uterus). This exceeds the requirements to enter Level 2, so 5 marks were awarded. The reference to a non-hormonal method (condom) has no impact on the mark awarded.

Contact us

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